

September 16, 2003
Case No.: DP-305565 (7500/87)
Serial No.: 10/081,122
Filed: February 22, 2002
Page 9

-- REMARKS --

Claims 1-20 remain under consideration. The allowability of claims 5-13 and 15-17 is noted. The claims have been amended to obviate informalities and improve their form. Claim 6 has been amended only to correct a formal matter, by replacing a misplaced period with a semicolon. No new material was added with the amendment to the claims.

CLAIM REJECTIONS UNDER 35 USC § 102

The rejection of claims 1-4, 14 and 18-20 under 35 USC § 102(b) as being anticipated by Leppek et al. (US 5,106,171) is traversed.

Claim 1, and claims 2-4 depending therefrom, all require *inter alia* a controller for determining when the force applying apparatus is in a fast mode release, and modifying the value of the electrical force signal sent to the actuator to limit the rate at which chamber pressure in the apply chamber is reduced during the fast mode release *to a predetermined rate low enough to preclude a change in modulus of the fluid during fast mode release.* (emphasis added). Leppek does not disclose the concept or problems associated with fast mode release, much less the limitations of claim 1 for determining when a force applying apparatus is in a fast mode release and modifying the value of the electrical force signal sent to the actuator to limit the rate at which chamber pressure in the apply chamber is reduced during the fast mode release *to a predetermined rate low enough to preclude a change in modulus of the fluid during fast mode release.* Leppek cannot, therefore anticipate claim 1 or any of claims 2-4 depending therefrom.

As discussed in great detail in the present application, an electrically driven actuator can move so rapidly, when the vehicle operator quickly removes force from the brake pedal, that local fluid pressure in the apply chamber of the actuator will drop low enough, without any detectable change in brake line pressure or wheel speed of the wheels being braked, that minute bubbles of volatile components of the brake fluid will form in the apply chamber, and create significant problems with brake actuation. See present application page 5, line 12 through page 6 line 17; page 12, line 25 through page 13 line 24.

September 16, 2003
Case No.: DP-305565 (7500/87)
Serial No.: 10/081,122
Filed: February 22, 2002
Page 10

To address this problem, prior to allowing any change in actuator position or pressure in the brake line to be initiated, the present invention determines whether a given release or reduction of pressure on the brake pedal would result in a fast mode release condition, and modifies the command signal that would otherwise be sent to the actuator to limit the speed of retraction of the actuator, so that the reduction in pressure within the apply chamber will be slow enough to preclude forming bubbles within the apply chamber. See present application page 13, line 11 through line 24.

Leppek addresses a totally different problem, and does not disclose anything related to the problem of not letting apply chamber pressure in an actuator drop too low that is addressed by the present invention. Leppek addresses the problem of maintaining acceptable braking force during the sudden pressure release that is incident with an ABS system dealing with an incipient wheel lock condition by an ABS controller rapidly releasing brake pressure for a calibrated period of time that is a function of wheel parameters, and in the process would potentially exacerbate greatly the problem addressed by the present invention. See Leppek column 2, lines 5-9; 34-54. The anti-lock brake system of Leppek would clearly suffer from the very problems that the present invention is addressing, and does not disclose any indication that Leppek would be capable of providing a solution.

The R3 condition of Leppek, cited by the Examiner in paragraph 2 of the Office Action, is a condition in which the actuator motor is powered at a maximum value to cause the highest motor speed and most rapid retraction of the piston 38 that is possible. Leppek, column 10, lines 57-59. There is no disclosure in Leppek of any understanding that, if the retraction rate is not limited, the rapid retraction will very likely result in a reduction of fluid modulus and a formation of the micro-bubbles, as is disclosed in the present Application. As is discussed in the present application, the formation of micro-bubbles would prevent proper operation of the brake apparatus of Leppek, following expiration of the KTS timing period of Leppek.

September 16, 2003
Case No.: DP-305565 (7500/87)
Serial No.: 10/081,122
Filed: February 22, 2002
Page 11

The apparatus and method of the present invention look at a desired force signal and anticipate whether or not a fast mode release condition is indicated – which could result in a reduction of fluid modulus large enough to cause micro-bubbles – before sending an electrical force signal to an actuator of a force generating apparatus. If it is determined that the desired force signal would result in a fast mode release, the electrical force signal is modified to preclude the formation of micro-bubbles. Leppek makes no such predetermination. If an input is received that would cause a very rapid application of the brakes, and a potential wheel lock-up, Leppek enters the R3 mode and reduces brake pressure as rapidly as possible during the duration of the KT5 time period, without any consideration as to whether such a rapid reduction in pressure would cause the adverse effects on fluid modulus addressed by the present invention.

Claim 14, and claims 18-20 depending therefrom, all require, *inter alia*, receiving a desired force actuation signal at the controller, determining when the force generating apparatus is in a fast mode release, modifying the electrical force signal to limit the rate at which fluid pressure in the apply chamber is reduced during the fast release mode *to a predetermined rate low enough to preclude a change in modulus of the fluid during fast mode release*, and sending the modified electrical force signal to the actuator. *Emphasis added.* As discussed above in relation to the rejection of claims 1-4, Leppek does not disclose these limitations, and cannot therefore anticipate any of claims 14, and 18-20. Claims 18-20 include additional limitations that are also not disclosed by Leppek.

September 16, 2003
Case No.: DP-305565 (7500/87)
Serial No.: 10/081,122
Filed: February 22, 2002
Page 12

SUMMARY

Applicants believe that the application is in condition for allowance. Reconsideration and notification of allowance are respectfully requested.

OFFICIAL

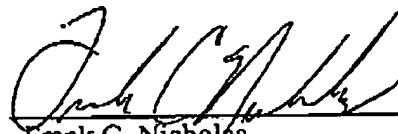
Dated: September 16, 2003

Respectfully submitted,
BRYAN P. RIDDIFORD, *et al.*

DELPHI TECHNOLOGIES, INC.
Legal Staff
Mail Code: 480-410-202
Troy, Michigan 48007
PO Box 5052
Phone: (248) 813-1235
Fax: (248) 813-1222

Scott A. McBain
Registration No. 37,181
Attorney for Applicants

CARDINAL LAW GROUP
Suite 2000
1603 Orrington Avenue
Evanston, Illinois 60201
Phone: (847) 905-7111
Fax: (847) 905-7113



Frank C. Nicholas
Registration No. 33,983
Attorney for Applicants

RECEIVED
CENTRAL FAX CENTER

SEP 17 2003